A New Species of *Calostoma* Desv. (Gasteromycete Fungi)

By G. A. Crichton[1] and J. H. Willis[2]

Introduction

While Victorian fungus hunters are familiar enough with that extraordinary if widespread puffball, *Calostoma fuscum* (Berk.) Mass., with its 8-15 cm stalk of interlacing, toughly gelatinous brown fibrils and bright yellow to scarlet escape-opening for the white spore-masses, not many observers are acquainted with its less conspicuous congener, *Calostoma rodwayi* Lloyd of fern gully habitats; this latter smaller puffball is almost level with the soil surface, its stalk being immersed in humus to the base of the peridium.

Generally Australia has been credited with these two species only, but collectors over recent years have brought to light some undescribed species, or at least species not previously recorded for the Commonwealth. One such discovery was made by Mr. Bruce A. Fuhrer, while collecting in the Little Desert National Park, far western Victoria, during November 1974 and again in November 1983. In order to establish the distribution of this possibly new species, approaches were made to various herbaria for loan of their *Calostoma* specimens — with quite unexpected results.

The University of Western Australia kindly supplied four specimens; two were labelled as "*C. fuscum*", but bearing little resemblance to the puffball referred to that species in the eastern States. One other specimen was considered to be *C. luridum* (Berk.) Mass., a name rejected by G.H. Cunningham (1942) as being synonymous with *C. fuscum;* it closely resembles specimens collected by Mr N.S. Bennet, at Stawell, Vic., in 1970. The fourth W.A. specimen does not agree with any other collections we have seen. The Botanic Garden of Adelaide and the University of Adelaide each had specimens of *C. fuscum* only. The National Herbarium at Sydney, N.S.W. has one collection from Queensland that does not match anything else examined so far, neither does a collection made by Mr Ian McCann, on the Victoria Range, Grampians, Vic., in 1970. Mr Fuhrer's Little Desert *Calostoma* is manifestly distinct from any of the five entities mentioned above, and we now formally describe it under the epithet "*fuhreri*" in honour of its perspicacious discoverer.

Calostoma fuhreri Crichton et Willis sp. nov. (Fig. 1)

*A speciebus duabus aliis in Australia descriptis (*C. fuscum *et* C. rodwayi*) sic differt: habitatione arida, parvitate (ad 28 mm alta), superficie peridii nigra, forma et amplitudine sporae atque "clipeo" magno irregulare retento stomatem velans.*

Holotypus: Damp depressions on sand ridges of Little Desert, Victoria, Australia, *B.A. Fuhrer* V10, Nov. 1974 (Herb. MONU).

Topotypi: loc. cit., *B.A. Fuhrer* 217, Nov. 1983, (Herb. MONU, DAR, K).

Description

Basidiocarps small, to 28 mm high when soaked (20 mm in dried state), solitary or gregarious, at first hypogean, becoming epigean, firmly attached to a pseudostipe;

Pseudostipes 15-20 mm long and 5-8 mm thick (when soaked), solitary or fused in groups, composed of gelatinous, slightly anastomosing strands of hyaline hyphae, wholly immersed in soil up to base of peridium and heavily encrusted with soil particles, without any evidence of volva.

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Exoperidium composed of large, lightly tinted, globose or irregularly swollen hyphae which gelatinize and remain at the apex of the mesoperidium as a tough shield covering the stoma; *shield* irregular, 3-10 mm wide, shed when the stoma splits, its underside moulded in the shape of the stoma and coloured the same vivid red.

Mesoperidium globose, to 8 mm dia., becoming pointed at summit as the stoma develops, stalked, rubbery, becoming horn-like in texture when dried, consisting of hyaline thin-walled but rather coarse hyphae 7-9 µm wide; walls of hyphae and interstitial cementing material staining with Cotton Blue to present a convoluted brain-like appearance; *exterior surface* covered with fine black granules (larger below mid-line) which are remnants of the gelatinized exoperidium.

Stoma imperfectly opening, slightly raised and formed by the splitting of the mesoperidial apex into 4-5 rays (or a long slit with shorter ones radiating), internally coloured a vivid red (Meth. A/8) from amorphous granules which may spill out into the surrounding area in a broad peristomatal band.

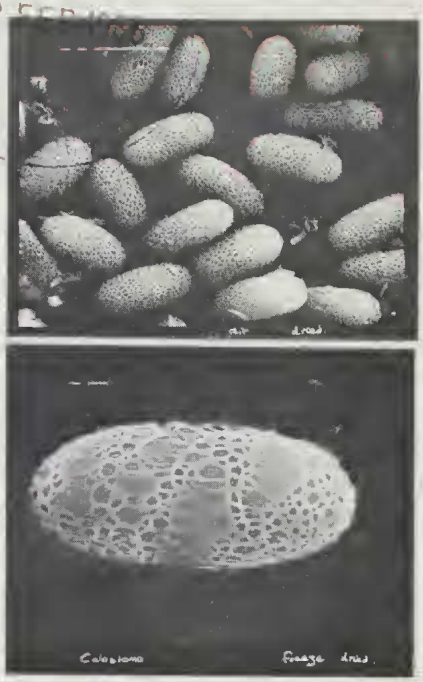

Fig. 2. *C. fuhreri*, SEM by Christine Shankly.

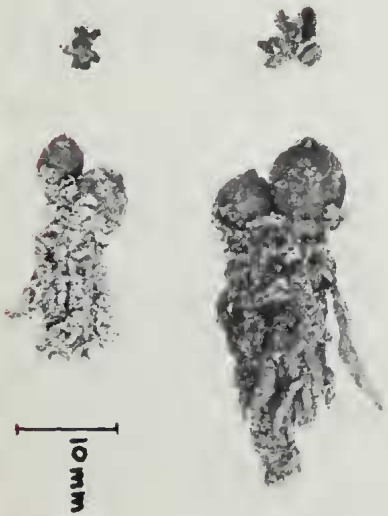

Fig. 1. *C. fuhreri*, by B. Fuhrer

Endoperidium (or *spore sac*) light yellow, rather tough, of loosely felted hyphae, with a few long, sparsely branched hyaline strands 1.5-2.0 µm thick, their contents staining deeply with Cotton Blue; sac detached except about the inside of the stoma to which it retracts as spores are expelled, sometimes even extruding from the stomatal opening.

Gleba white, apparently structureless, of broken hyphae and spores, without evidence of a hymenium; *basidia* wineglass-shaped, tetrasporous, borne singly either randomly or at the ends of hyphae.

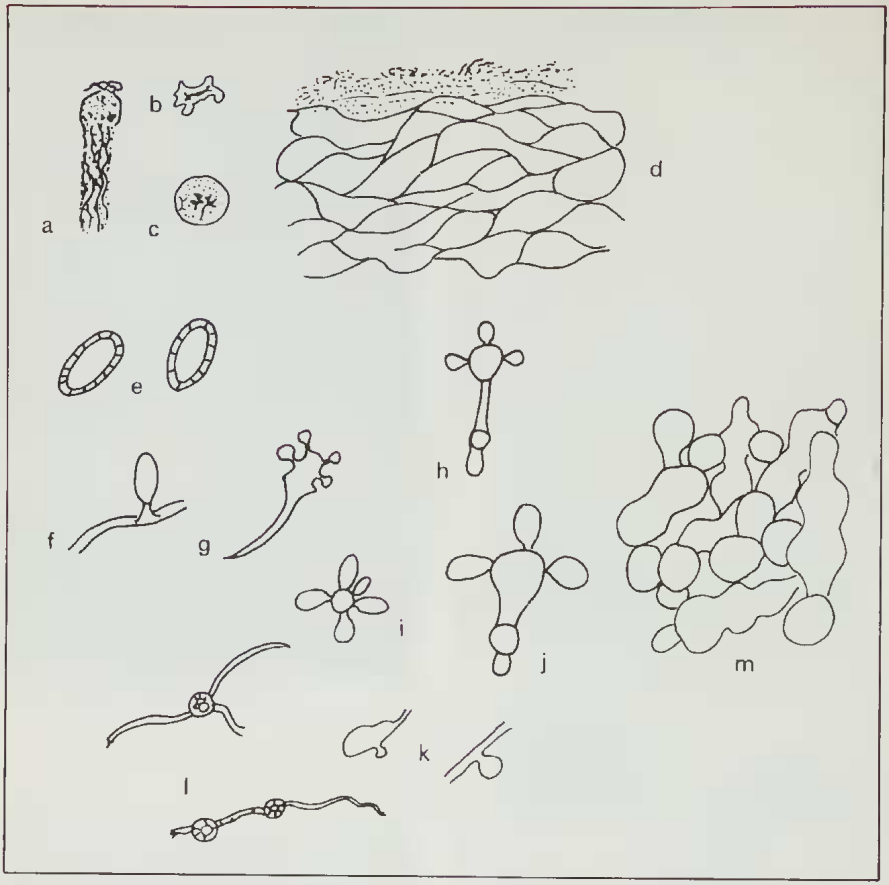

Fig. 3. *Calostoma fuhreri* sp. nov. a) approx. 0.75 actual size, b) shield over stoma, c) stoma, d) structure of mesoperidium, e) spores in section, j-k) stages of basidia and spore development, l) glebal hyphal fragments, m) structure of exoperidium.

Spores oblong-elliptical, (14) 20-26 (28) × (7) 9-11 μm, hyaline, appearing closely and evenly verruculose under light microscopy, unevenly reticulated under scanning electron microscope (Fig. 2): all spore measurements include exosporial ornamentation; inamyloid in Melzers: no reaction to KOH.

No clamp connections located.

Discussion

C. fuhreri differs from other species of the genus so far attributed to Australia in its habitat (arid sand-hill country), its small size, black peridial surface, large size and shape of the spores, and retention of the large irregular "shield" for some time over the stoma; this shield differs from the opercular structures of both *C. fuscum* and *C. rodwayi* in its swollen balloon-like hyphal composition. (Fig. 3)

The second collection, which was much more extensive than the first, provided extra information upon which the above description was confirmed; also details of their behaviour under varying weather

conditions were noted, the presence of specimens being mostly suspected by the cracking of a thin crust of the surface soil. When soil was moistened the puffball would be pushed above the surface by expansion of its gelatinous stem; upon drying it would again retract into a cup-shaped cavity in the soil. Specimens were often seen to be crowded, many with multiple heads from thickened stems.

REFERENCES

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Massee, G. (1888). Monograph of Genus *Calostoma. Annals of Botany 2(5):* 25-46.

Finger Fern *Grammitis magellanica* subsp. *nothofageti* Parris (Grammitidaceae) — a New Record for the Australian Mainland

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Introduction

Until recently the Fern *Grammitis magellanica* subspecies *nothofageti* was only known to occur in New Zealand, where it is widespread, and in two localities in Tasmania — Hastings Cave and Mt. Field National Park. It was therefore of great interest to discover the species on the Australian mainland in the Otway Ranges, Victoria.

Description

G. magellanica ssp. *nothofageti* is a small solitary epiphytic fern growing on the trunks of the Musk Daisy bush, *Olearia argophylla,* from 1-2 m above ground level. (Fig. 1).

It has finger-like fronds over 80 mm long and less than 5 mm wide. Venation is forked with the vein apices terminating well inside the frond margin and sori occurring on each side of the midrib (Fig. 1b).

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Locality

G.magellanica ssp. *nothofageti* has so far been found in one locality in the Otways, near the Little Aire Falls, off Phillips Track, approx. 8 km south west Beech Forest Township.

Grid reference 143° 30′ 45″ Long., 38° 39′ 59″ Lat. Collected 29 Jan. 1985 by P. Barnett. Collections have been lodged at the State Herbarium of South Australia and the National Herbarium of Victoria.

Habitat

The fern grows on the trunks of the Musk Daisy-bush, *Olearia argophylla* where it gains moisture from the trunk, and probably feeds off the breakdown of lichens and mosses growing on the tree.

In this locality *O. argophylla* forms an understorey to Mountain Ash, *Eucalyptus regnans,* which show no signs of a bushfire since being logged some 40 or 50 years ago.

The Aire Valley is one of the wettest parts of the State with more than 200 rainy days per year. Rainfall varies from